

MEDICAL

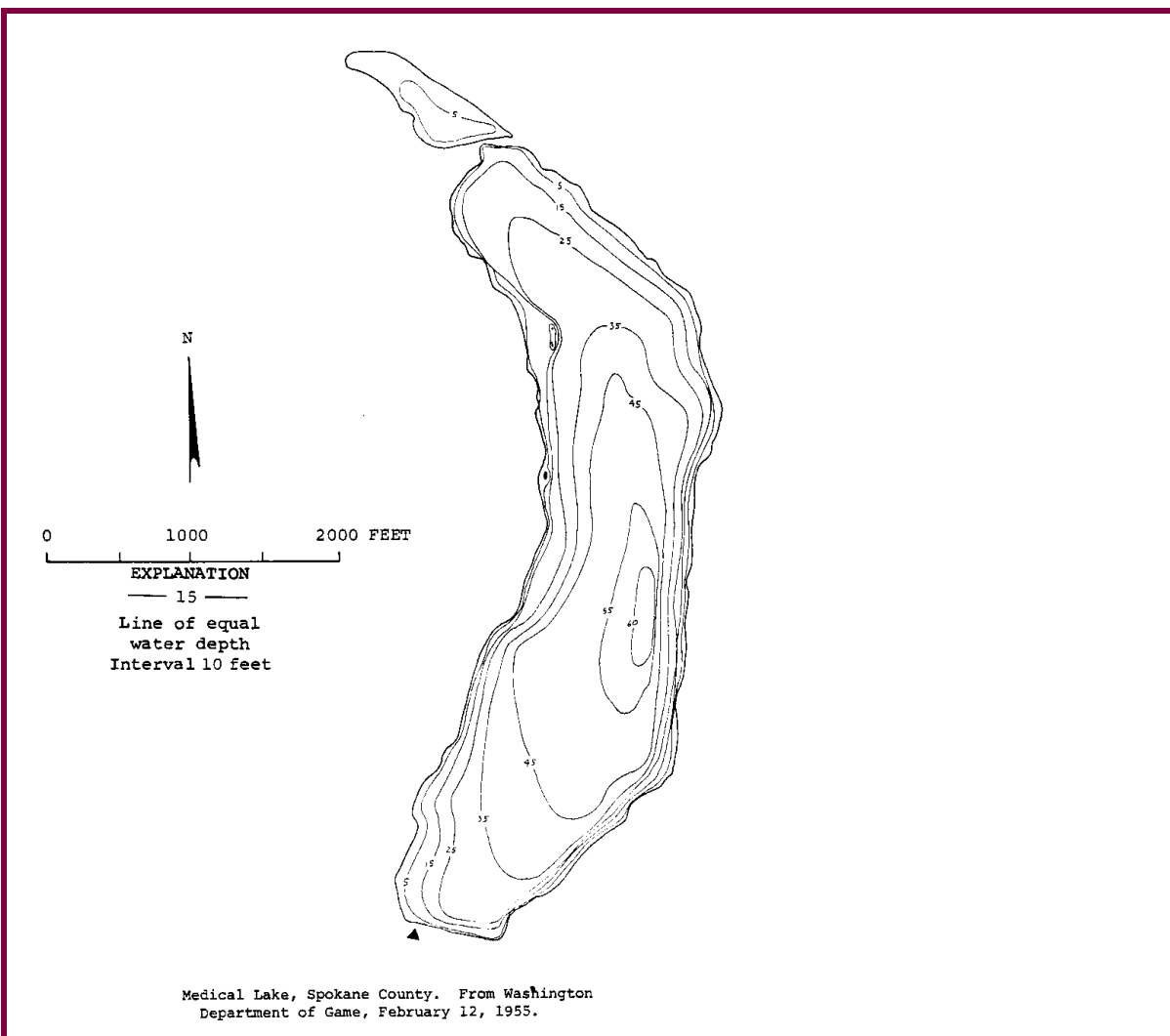
SPOKANE County

Lake ID: MEDSP1

Ecoregion: 7

Medical Lake is located approximately 10 miles southwest of Spokane. The City of Medical Lake lies along its eastern shore. The west shore is mostly undeveloped, with Consolidated Support Services set back from the lake to the west. Residential homes line much of the eastern shore. There is a city park on the north shore and a walking/biking trail around lake. Medical Lake's water quality is improved with the help of an aerator. The lake is a popular recreational lake and supports a variety of uses despite the rich eutrophic conditions. Motors are prohibited on the lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
160	60	32	1.35	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
5000	3.14	2394	47 33 48.	117 41 21.



Station Information

MEDSP1

Primary Station	Station # 1	latitude: 47 34 18.8	longitude: 117 41 16.0
Description: Site is 50' south of S. aerator			

Trophic State Assessment for 1998

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Analyst: KIRK SMITH

TSI_Secchi:	53	N
TSI_Phos:	53	
TSI_Chlor:	44	
Narrative TSI: ^a	E	

Medical lake is probably naturally eutrophic. Kemmerer reported eutrophic conditions there in 1924. The lake was treated with alum in 1977 and an aerator has been operated in the lake since 1987 (see Soltero, et al., 1994, Partial and full lift hypolimnetic aeration of Medical Lake, WA to improve water quality, Wat. Res. 28(11):2297-2308). Despite the aeration, however, in 1998 the hypolimnion remained nearly anoxic through most of the summer and internal nutrient loading was pronounced.

The lake supports multiple uses including fishing, swimming, and wildlife. The zooplankton community appears to be healthy enough to support a good sport fishery; however, the low hypolimnetic dissolved oxygen and warm surface temperatures are not ideal for a trout fishery. If the lake is to be managed as a coldwater fishery, increased aeration may be desirable. Only five user surveys were returned; two of the respondents believed the water quality had improved in the lake. Two others believed the water quality had deteriorated while one person did not know.

Fecal bacteria concentrations were extremely high at the city park at the north end of the lake. Geese were almost certainly the source and control options should be considered to keep geese out of the park. Soils on the east shore were eroding and might benefit from management such as planting of native shrubs.

It is difficult to set nutrient criteria in a lake that has been altered in a restoration effort and where the trophic state and other parameters are artificially maintained. The beneficial uses appear to be supported, at present, through the use of the aerator. We cannot recommend a criterion for Medical Lake without further study. We recommend continued use of the aerator and continued efforts to tune aeration volume to reduce internal nutrient loading.

^a E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data

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Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/16/1998		L					3			
		L					25			
7/14/1998		L					1 U			
		L					4			
8/11/1998		L					1000 G			
		L					2			
9/15/1998		L					84			
		L					100			
Station 1										
6/16/1998		E	42.2	.822	19	5.7		142		5.4
		H	121 J	1.09	9					
7/14/1998		E	37	1.02	28	1.7				4.8
		H	152	1.77	12					
8/11/1998		E	25.7	1.19	46	2.5				3.9
		H	122	1.53	13					
9/15/1998		E	25.5	.982	39	2.9				3.5
		H	145	1.65	11					

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than, G=Greater than.

Watershed Survey

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Survey Date: 9/15/1998

Land Uses (1 = Primary, 2 = Secondary, etc.)

☐ 2 Agriculture(commercial, not hobby)☐ 3 Commercial, Industrial☐ Major transportation☐ 1 Residential☐ 4 Park, forest or natural

Impervious surfaces (Roads and parking area): No Curbs

Observations (check mark denotes presence)

BMP's ☐

Odors ☐

Cattle ☐ Ducks ☐ Geese ☒

Geese at N. end of the city park (Peper Park--high feces there too).

Fertilizers and weed killers appear to be used in residential or agriculture area ☒

CSS lawns, Med. Lake residents lawns, wheat fields to west of CSS.

Buffer zones around streams and wetlands ☒

Shoreline is mostly natural and rocky--not particularly susceptible to erosion in most place (however, see aquatic plant survey). Overall watershed assessment--no clear major impacts.

Irrigation ☐

Survey Id: 75

Habitat Survey Summary Report

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Data are averages of 10 Stations Surveyed

Date of Visit: 7/14/1998

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg:	1.2	Number of stations with canopy:	10
Understory Avg:	2.6	Number of stations with understory:	10

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer:	trees > 0.3 m DBH	1.1
	trees < 0.3 m DBH	0.9
Understory:	woody shrubs saplings	1.4
	tall herbs, forbs grasses	1.6
Ground Cover:	woody shrubs seedlings	1.2
	herbs, forbs, grasses	1.5
	standing water or inundated veg	0.2
	barren or buildings	1.1
Substrate Type (within shoreline plot):	bedrock	0.7
	boulders	1.4
	cobble/gravel	1.0
	loose sand	0.0
	other fine soil/sediment	0.5
	vegetated	2.4
	other	0.2
Bank Features:	angle (0:<30; 1: 30-75; 2:nr vertical)	0.7
	vertical dist (M from wtrln to high wt):	0.2
	horiz. dist. (M from wtrln to high wt):	0.1

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	0.6
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commercial	0.0
park facilities	0.2
docks/boats	0.3
walls, dikes, or revetments	0.6
litter, trash dump, or landfill	0.0
roads or railroad	0.2
row crops	0.0
pasture or hayfield	0.0
orchard	0.0
lawn	0.3
other	0.3

Physical Habitat Characteristics

station depth (at 10 m from shore)	3.4
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Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.6
boulders	1.1
cobble	1.5
gravel	0.3
sand	0.0
silt	2.5
woody debris	0.1

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	2.7
emergent	0.5
floating	0.0
total weed cover	2.7

Do macrophytes extend lakeward (-1 = yes, 0 = no)	-0.7
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Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.7
snags	0.5
brush or woody debris	0.6
inundated live trees	0.0
overhanging vegetation	0.5
rock ledges or sharp dropoffs	0.1
boulders	0.7
human structures	0.1

Questionnaire

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Results compiled from 5 Surveys. Average time (years) respondents spent on lake: 9.60

Did the following add (+1), detract (-1), or have no effect (0) on your enjoyment of the lake today?

Types of WaterCraft:	0.8	View:	1.0	Distance to Lake:	0.3
Public Access:	0.8	Swim Beach:	0.2	Canada Geese:	-0.2
Water Clarity:	-0.4	Water Qual. for Swim:	-0.4		
Fishing Quality:	-0.2	Aquatic Plants:	-0.2		

On a scale of 1 (poor) to 5 (excellent), how would you rate water quality today? 2.2

Which would you rather have, 1 or 2?

- 1) Better fishing and more natural habitat, or 2) clearer water? 1.8
- 1) Better fishing and more natural habitat, or 2) fewer aquatic plants? 1.4
- 1) Clearer water, or 2) fewer aquatic plants? 1.0

How important is each of the following characteristics to you (1 = very undesirable, 5= very desirable):

Restricted Watercraft:	5.0	Good Warmwtr Fishing:	3.8	Natural Scenery:	4.6
Plant Growth:	2.2	Good Swimming:	5.0	Public Beach:	3.8
Natural Shoreline:	4.2	Less Algae:	4.6	Canada Geese:	3.6
No Odors:	5.0	Public Access:	3.0		
Good Coldwtr Fishing:	3.6	Clear Water:	4.8		

Tabulated Results

Survey ID	Date	-----Residency-----	Rent or Own	Primary Activity*	-----Water Clarity----- Purchase Factor?	Has it Changed?	When?
30	8/11/1998	Resident	Seasonal	Own	10	<input type="checkbox"/>	Better compared to
31	8/11/1998	Resident	Permanent	Own	6	<input type="checkbox"/>	Worse 1996
Good beach access. Smells, especially @ spring turnover. Quality is horrible.							
35	8/14/1998	Resident	Permanent	Rent	7	<input type="checkbox"/>	Better
80	8/26/1998	Resident	Permanent	Rent	6	<input type="checkbox"/>	Unknown
81	8/14/1998	Resident	Permanent	Rent	10	<input checked="" type="checkbox"/>	Worse
Since no power boats are allowed, the lake environment is, for the most part, quiet and peaceful. Lots of ducks and geese which I like. Walking path around the lake is excellent.							

* 1=canoe/kayak, 2=fish, 3=pers. wtrcraft, 4=mtrboat, 5=sail, 6=swim/wade, 7=watch wldlf, 8=ski, 9=windsurf, 10=relaxing

Zooplankton Report

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Date 6/16/1998 Station: 1 Date difficult to read on label, may be incorrect.
Sample ID 30

Number of organisms measured: 302

Group	Percent	Group	Percent
Cladoceran	26.2%	Small < 1mm	93.0%
Copepod	73.8%	Large >= 1mm	7.0%
Other		Ratio of large to Small:	0.07
		Average size (mm):	0.46

Date 8/11/1998 Station: 1
Sample ID 31

Number of organisms measured: 356

Group	Percent	Group	Percent
Cladoceran	84.8%	Small < 1mm	98.9%
Copepod	15.2%	Large >= 1mm	1.1%
Other		Ratio of large to Small:	0.01
		Average size (mm):	0.48

Aquatic Plant Data

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Sampler: Parsons, O'Neal

Survey Date: 7/14/1998

Max depth of growth (M): ~ 4

Comments Water color blue-green and opaque. Paved bike path circles lake on west shore, homes along most of east shore. Soils on east shore eroding, some shrub plantings might help. Popular recreational lake. Much algae in water - forming mats along west, south and north and parts of east shore, much periphyton on plants. Did habitat survey for Kirk Smith

SPECIES LIST

Scientific Name	Common Name	Dist ^a	Comments
<i>Myriophyllum sibiricum</i>	northern watermilfoil	2	blooming
<i>Phalaris arundinacia</i>	reed canarygrass	3	
<i>Potamogeton pectinatus</i>	sago pondweed	3	with fruit
<i>Ranunculus aquatilis</i>	water-buttercup	2	blooming
<i>Ruppia maritima</i>	ditch-grass	4	blooming
<i>Scirpus sp.</i>	bulrush	2	
<i>Typha latifolia</i>	common cat-tail	2	blooming

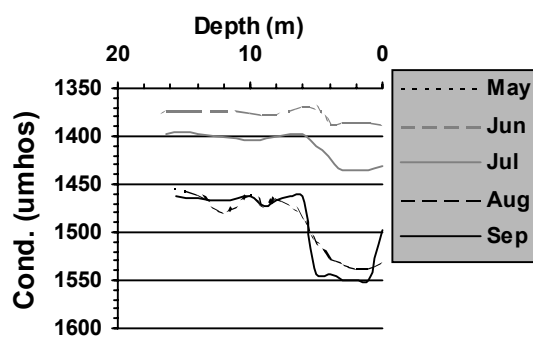
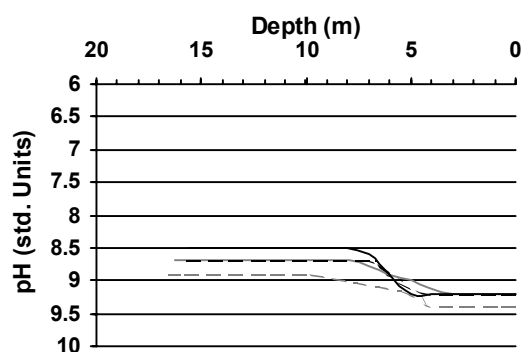
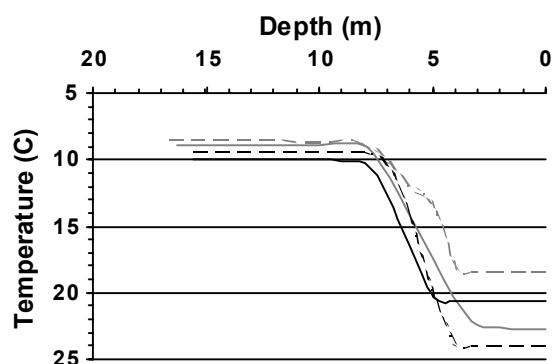
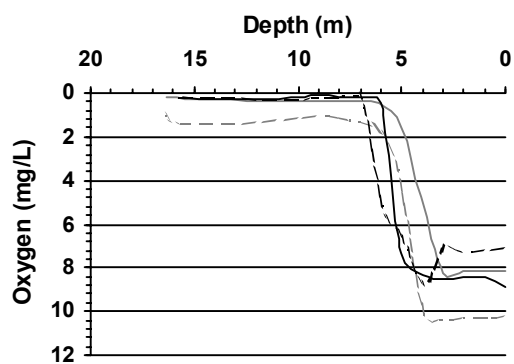
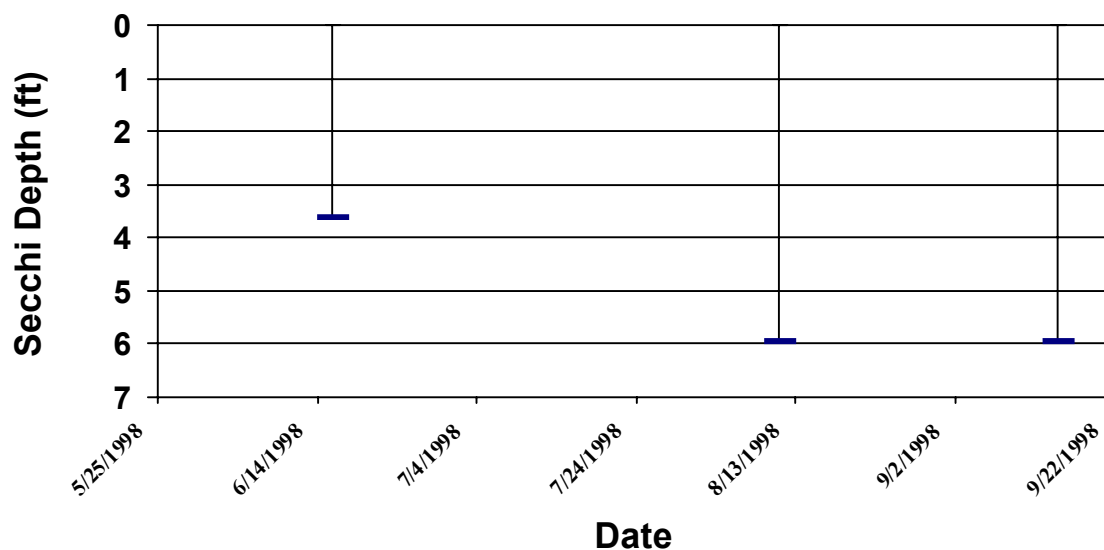
^a 0 - value not recorded (plant may not be submersed)
2 - few plants, but with a wide patchy distribution
4 - plants in nearly monospecific patches, dominant

1 - few plants in only 1 or a few locations
3 - plants in large patches, codominant with other plants
5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1

MEDSP1



Secchi Data and Field Observations

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Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/16/1998			3.63	2	100	1	1	3	3	30	3	0	0
	Sampler: HALLOCK			Remarks:									
7/14/1998					80	1		2	2	30	11	0	0
	Sampler: HALLOCK			Remarks: CLOUDY GREEN. OCCASIONAL CLUMPS OF FIBROUS, TAN ALGAE; SAMPLE TAKEN									
8/11/1998			5.94	2	0	1		2	3	100	25	0	0
	Sampler: HALLOCK			Remarks: LOTS OF ZOOPLANKTON, INCLUDING A FEW LARGE DAPHNIA. MILD ANOXIC SMELL @ 10 AND 15M BUT NOT H2S. APPROX 40 HOMES ON EAST SHORE.									
9/15/1998			5.94	6	0	1		3	3	20	0	0	0
	Sampler: HALLOCK			Remarks: NO COLONIAL ALGAE VISIBLE. HYPOLIMNION ALMOST ENTIRELY ANOXIC. THE USUAL BUBBLES (NEAR SHORELINE) FROM AERATOR ARE VISIBLE. HYPO SAMPLES ARE SLIGHTLY BLACK. 15M SAMPLE, SLIGHT H2S SMELL.									